imperfect roof" in the region of the fore-brain, hardly accords either with fact or with the characters delineated in Fig. 138. In dealing with another complex matter—the origin of the fœtal membranes—the student's attention is abruptly transferred (p. 509) from the vitelline membrane to the amnion, and that in such a manner that he would scarcely follow what is really meant. Closely allied is the description of the germinal layers, and we doubt if the bare statement (p. 34) that "the outer and inner layers undertake the functions which their position entails on them" is justifiable.

The work is got up in good style. The technical terms are printed in large type, but the choice of these is not always happy; on p. 5, for instance, in describing the movements of living protoplasm, we find the words "stream" and "gliding" set up in large letters; while, on p. 12, where the time-honoured terms "ontogeny" and "phylogeny" cannot well be dispensed with, neither they nor equivalents are employed—in fact, but for the aphorisms quoted on p. 13, the arguments used under the head of "development" would hardly carry conviction. Considering the nature of the book there are very few typographical errors. The more important are: p. 49, the description of Aspidogaster as "*ecto*parasitic;" p. 138, the "*anterior posterior* of the digestive tract;" and, p. 501, "the *cephalous* Mollusca, such as the mussel," &c. The illustrations are, for the most part, fairly good. Fig. 11, representing, as it does, only one-half of an anemone, is not easily intelligible to the reader, and the student should be informed what the right half of Fig. 22 is intended to illustrate. Fig. 66 illustrates but feebly part of an important subject—Mammalian odontology—which is poorly dealt with. Figs. 36, 42, 81, 82, 101, 170, and 192, are all out of place in a work of this kind. They convey little or no impression to the mind of the student, and are bare schemes such as an observer might construct for use in his own private notebook *side by side with actual drawings of the facts observed.* Diagrams such as Fig. 101 should never be shaded up, as if indicative of actual appearances.

To sum up. The author has successfully produced, at immense labour, a volume, of service to those who already possess a practical knowledge of the broad principles of the subject. A "Manual for Students of Medicine" it emphatically is not, except under that atrocious and misdirected *régime* of parrot-work not yet extinct. For this the system, and not the author, is to blame; he has performed a good service, the return for which will but ill repay him. G. B. H.

BRITISH DAIRY FARMING

British Dairy Farming. By James Long. (London: Chapman and Hall, 1885.)

THIS very readable volume is from the pen of one who evidently understands the highly technical subject to which he has devoted himself. Writing upon agriculture has too often been attempted by mere theorists, and as an inevitable consequence practical men have been contented to cursorily scan and forthwith consign both book and author to oblivion. In this department more than in many others those who know are not book-writers and those who are book-writers do not know. Mr. Long is happily able to exercise the discernment which comes of knowledge in the marshalling of his facts and the quality of his suggestions. In his introductory chapter he gives solid statistical reasons why we should as a community endeavour to "produce more and import less," and the subsequent chapters are devoted to a review and comparison of our dairy system and those of our Continental neighbours, much to the advantage of the latter. The genius of the English farmer does not appear to have as yet shone into his dairy. His fields, his machines, his cattle stalls, his animals, have each and all been the admiration and the model of Europe and America. But he pauses on the threshold of his dairy and, we may add, his hen-house. These are, he thinks, the proper domain of the dairy-maid or the housewife, and the farmer is done with the milk when he has set it down at his dairy door.

It is a case parallel with that of our *cuisine.* We produce the finest beef and mutton, but we are only too constantly reminded of the forcible old proverb that while God sends meat the Devil sends cooks. There is some ground for hope that we shall, if only by force of competition, be compelled to further elaborate our products. English cheese is excellent, but it is lamentably wanting in variety, and certainly is much too apt to be regarded as one of the necessaries rather than as one of the amenities of our daily fare. Butter-making offers fewer facilities for innovation, but much requires to be done before we can successfully compete with the butter-makers of Denmark, Normandy, and Brittany. It is to cheese-making that Mr. Long devotes the largest share of his space. In England the principal cheeses may be almost told off upon the digits of one hand: they are "Stilton, Cheshire, Cheddar, Gloucester, Derby, and Leicester." The two last are, however, a little less definite than the first four, and we do not quite see their right to continue a list so well begun. Derby and Leicester are, no doubt, very good cheeses, but if they are to be admitted to stand in the same relation to English dairying as Stilton and Cheddar, we think Mr. Long might well have increased his list by adding Cutherston, Dorset-blue, North Wilts, and other cheeses well known to thousands of admirers. The principal English cheeses are, however, undoubtedly the first four mentioned in Mr. Long's list, and, with the exception of the Stilton, none of them can compare, in the estimation of an epicure, *connoisseur*, or *gourmand*, with the soft, rich, palatable cheeses imported to this country under a puzzling variety of appellations.

The chief interest of Mr. Long's book consists in his minute workable descriptions of the manufacture of a large number of cheeses, which indeed appear to be as numerous and various as are different sorts of wines. The book is well illustrated, and the "plant" required for carrying on the manufacture of some of the cheeses is complicated and expensive. Still, there appears to be no reason why similar cheeses should not be successfully made in England, and it is not improbable that the processes would be further improved in English hands were the matter once taken up.

Take, for example, Camembert:—

"The rennet is added to the milk at a temperature similar to that at which it is drawn from the cow: it is heated in a tub, and a portion of the morning's milk is added to the milk

© 1885 Nature Publishing Group

of the previous evening. . . . When the rennet is added the milk is gently stirred with a long spoon for two or three minutes; a wooden cover is then placed on each pan, and it is left for five or six hours. . . . The curd is then taken out by spoonfuls and put into cylindrical white metal moulds which cost about 4*s*. 6*d*. a dozen, and which are open at both ends. These are previously placed upon rush mats upon slightly inclined tables, and which have on the lower extremity a small gutter which carries off the whey into a receptacle beneath. . . . When the curd has remained two days in moulds the cheese possesses consistency enough to enable it to be moved with ease. Then the left hand is placed beneath it, and, assisted by the right hand, cheese and mould are turned, so that the top face is placed at the bottom, in contact with the mat. At the end of thirty-six to forty-eight hours from filling, the cheeses are taken out of the moulds and salted. . . . When salted, they are placed upon the wooden shelves above the draining tables, and here they are left for two or three days until they are ready to be sent to the *hâloir*."

We have quoted the foregoing passage in order to show that there is nothing more complicated in the making of a French Camembert cheese, nor yet so complicated, as in the making of an English Cheddar. Whether by following Mr. Long's directions an English dairyman could produce the correct type and flavour can only be demonstrated by trial, but probably a cheese would be produced suitable to English methods which would add to the variety of our dairy products and find a ready market. Mr. Long also describes the manufacture of various other cheeses, among which are Pont l'Evêque, Livarot, Mignot, Boudon, Brie, Géromé, Coulommiers, Mont d'Or, Void, Suisse, St. Remy, Gervais, St. Marcellin, Jour iac, Gex, and a large number of others, the mere mention of which would occupy more space than we can spare.

Mr. Long has certainly contributed a handy text-book which it is hoped will find its way among and be studied by dairy farmers.

JOHN WRIGHTSON

OUR BOOK SHELF

Chain Cables and Chains. By Thomas W. Traill, C.E., R.N., the Engineer-Surveyor to the Board of Trade. (London: Crosby Lockwood, and Co., 1885.)

IN the volume before us we find the business of chain cable-making in its several branches well explained and illustrated; nor does the aim of the author end here. There is information given which is most useful to surveyors and inspectors, and we recommend all who have to deal either with the manufacture, inspection, or testing of chain cables to study the work. The volume contains many well-executed plates, showing good, bad, and indifferently-formed links, &c., for various kinds of cables, also tables of the best dimensions of each part of each link and shackle used in cables from 7-16th to 2½ inches, the dimensions being given in decimals to two places, and also calculated to thirty-second parts of an inch. We find also exact copies of certificates given by the several public proving establishments, seven plates in all, more than one example being quite unnecessary, varying as they do only in colour and the name of the town in which the establishment happens to be.

After a few pages giving an outline of the general manufacture and the methods of welding the links, we have a long historical chapter of the early uses of metallic chains, in which we are told that their uses date back to the time of Pharaoh and King Solomon; but it was not until 1808 that chain cables were used on board ship; at this time a chain cable was used in a vessel called the *Ann and Isabella*, of 221 tons, built at Berwick, and owned by Joshua Donkin. This cable was made by Robert Flinn, in North Shields, perhaps the first artificer in chain cables. In the year 1833 the first machine for testing iron cables in a Government yard was put down at Woolwich, and in 1834, although chain cables were almost in general use, the rules of Lloyd's Registry only specified the length, and it was not until twelve years afterwards it was part of the surveyor's duty to see that they had been properly tested. The author gives a very interesting account of the progress of manufacture and general adoption of iron cables. We then find the various Acts of Parliament pertaining to their use given in full. All public proving establishments are now under the management of Lloyd's Committee.

The method of proving chain cables is as follows:—From every length of 15 fathoms of the cable to be proved a piece consisting of three links is taken and subjected to an appropriate breaking-strain. If the piece so selected fail to withstand such a breaking-strain, another piece of three links is taken from the same 15-fathom length and tested in a like manner. If the first or second of such pieces withstand the breaking-strain, the remaining portion of the 15 fathoms of cable is then subjected to the tensile strain. If it is found that after the application of the tensile strain the cable is without defects or flaws, it is then stamped as proved with the distinguishing marks of the proving establishment; on the other hand, should the cable fail to stand the appropriate tests, it is rejected. Mr. Traill condemns the overtesting of cables, considering that the material is injured by so doing, and we agree with him in saying:—"A moderate test is all that is not detrimental. Proving the iron from which the cable is made, and breaking a sufficient number of samples, is what can and should be done to prove the actual quality and reliability of a chain."

The volume does great credit to the publishers, being well printed on good paper. We can safely recommend this work to all in any way connected with the manufacture of chain cables and chains as a very good book.

United States Coast and Geodetic Survey. Determination of Gravity at Stations in Pennsylvania, 1879-1880. *Appendix No*. 19. *Report for* 1883.

THIS appendix is a portion of the Annual Report of the U.S. Survey, and contains the pendulum observations made in 1879-1880 by Mr. C. S. Peirce at three stations in Pennsylvania—namely, at the Alleghany Observatory, at Ebensburg, and at York. The observations form part of a series undertaken in connection with the Geodetic Survey of the United States. A Repsold reversible pendulum was used and oscillated *in vacuo*, using various kinds of supports. At York a series of experiments were made to determine the effect of the flexure of the support. It appears from a previous report (Appendix No. 14 of 1881) that Mr. C. S. Peirce maintained against MM. Plantamour and Hirsch in Switzerland, that the oscillations of the support have a marked effect on the time of oscillation of the pendulum, and he accordingly undertook an exhaustive series of experiments to prove his point, and to measure the allowance to be made. The experiments given in Appendix No. 19 are only a small portion, and are in fact re-published from Appendix No. 14, with some few corrections. The question was disposed of in Appendix No. 14, and it was clearly shown that the flexure of the support ought to be taken into account, and it is evident, therefore, that the stiffness of the support is of vital importance. Experiments were also made at York to determine the relative value of the method of transits and a method of eye and ear coincidences invented by Mr. Farquhar; the method is not described, but appears to be far less accurate than the method of transits. The effect of substituting steel

© 1885 Nature Publishing Group